



- 1 Color-tunable OLED.
- 2 TABOLA® OLED.

## COLOR-TUNABLE OLED

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### Exposé

Ultrathin light sources with high efficacy and very good color quality can be realized based on OLED technology on rigid as well as on flexible substrates. Furthermore OLED technology has a unique position due to its characteristic as a non-glaring planar solid-state-lighting source. A characteristic that cannot be realized with current inorganic LEDs, namely point light sources. A variety of novel applications appear to be possible based on this existing technology.

Target of the research and development work at Fraunhofer COMEDD is a further broadening of the application fields of OLED technology. Recently, researchers at Fraunhofer COMEDD were able to realize a color-tunable OLED.

the interior of trains, cars or planes. It will be possible to simulate e. g. the ambient lighting conditions of each time slot of the day: a highly blue light in the morning, white around noon, and comfortable warm reddish or yellowish light in the evening.

Furthermore Fraunhofer COMEDD is working on the integration of additional functions into the OLED for further niche markets. We are able to integrate customer specific needs for the development and implementation of new technologies.

The color-tunable OLED is desirable for various lighting applications e. g. integrated in



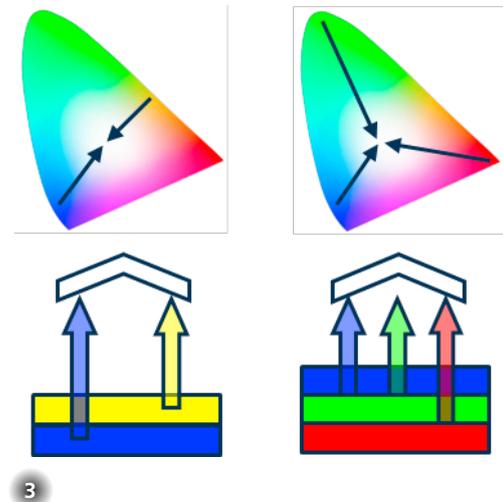
## Technology

The previous approaches to realize color-tunable OLED have been performed by dividing the lighting plane into extremely small pixels such as display technology or narrow stripes for the realization of each color (blue, green, red) and driving them with different voltages. In contrast to this technology Fraunhofer COMEDD developed so-called »stacked« OLEDs.

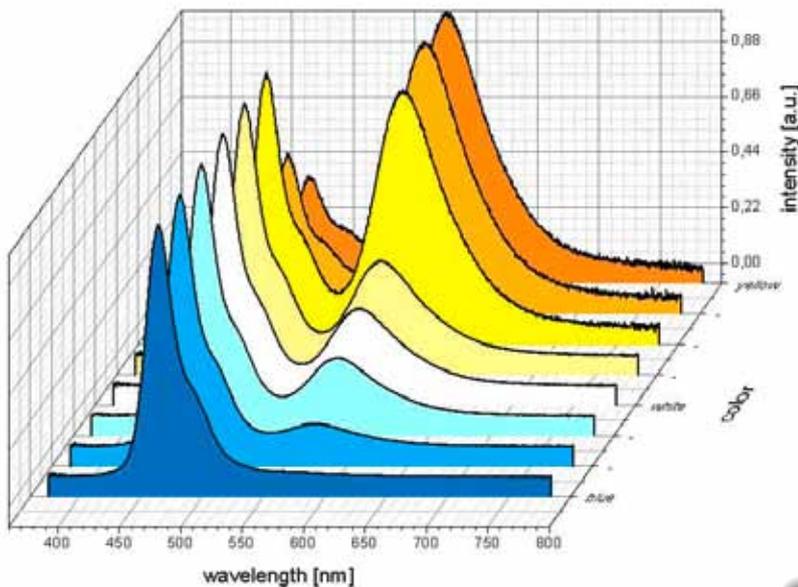
The technology is based on a vertical stacking of OLEDs where each OLED can be controlled separately. A lateral patterning

is not required. By using this technology, the color of the emitted light can be tuned continuously. According to the application combinations of two or three colors are possible. Using different process technologies Fraunhofer COMEDD was able to achieve the right stack architecture including the optimized thickness of the individual OLEDs for an appropriate efficacy.

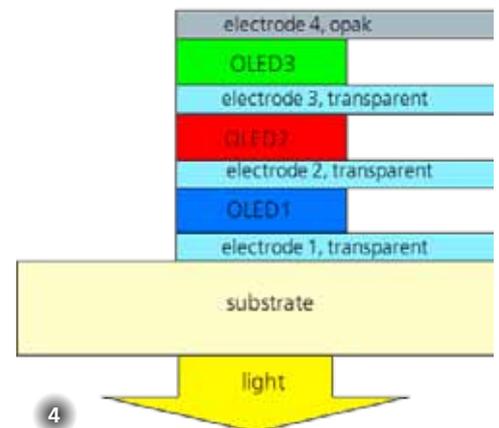
These results have been reached within a Fraunhofer internally funded project (600024).



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3 Schematic layout of a white-emitting two-color (right) and three-color (left) OLED.

4 Layers of the three-color OLED.

5 Emission spectrum of two-color OLED.